Exhibit 2.C

Wayne County Department of Health, Air Pollution Control Division, Staff Activity Report (July 2, 1990)

WAYNE COUNTY DEPARTMENT OF HEALTH

AIR POLLUTION CONTROL DIVISION

STAFF ACTIVITY REPORT

July 2, 1990

APPLICANT

National Steel Corporation
Great Lakes Division
No. 1 Quality Drive
Ecorse, Michigan 48229

Wayne County Installation Permit Nos. C-6426 and C-7070
Michigan Department of Natural Resources Permit To Install No. 650-88

SIGNIFICANT DATES

December 31, 1986	- Original No. 5 Coke Oven Battery was shutdown as required by Wayne County Civil Action No. 85-531155-CA
August 1, 1988	- Original permit information submitted
September 22, 1988	- Permit application submitted to the Michigan Department of Natural Resources
February 13, 1989	- Coke oven door information submitted
April 25, 1989	- Assessment of LAER control technology submitted
January 16, 1990	- Additional modelling information submitted
March 29, 1990	- Division staff visit coke oven battery at Granite City Steel in Illinois
March 30, 1990	- Division staff visit coke oven battery at Citizens Gas & Coke Utility in Indiana
May 10, 1990	- Data regarding PSD netting exercise for sulfur dioxide, bypass flare and total reduced sulfur emissions submitted. Revised benzene emission estimates submitted.
May 16, 1990	- PM-10 emission data for sinter plant and #6

boiler submitted.

May 17, 1990 - Letter expressing Great Lakes Steel's intent to shutdown #4 Battery submitted.

June 12, 1990 - Public information meeting held in Delray area of Detroit

SITE LOCATION

The #5 Coke Oven Battery rebuild is to be located on Zug Island in River Rouge, Michigan. The Zug Island plant is bounded by the Rouge River to the north, west and south and the Detroit River to the east. See Exhibit 1 for an area map.

DESCRIPTION OF PROPOSED FACILITY

The Great Lakes Division of National Steel Corporation proposes to rebuild their #5 Coke Oven Battery at the Zug Island Plant. The original battery was shutdown on December 31, 1986, as stipulated in Wayne County Civil Action No. 85-531155-CA. The proposed #5 Coke Oven Battery consists of 85 individual ovens which are nominally 19 feet, 3/4 inches high (six meters) by 49 feet, 1 inch long by 18 inches wide and will be used to produce blast furnace coke using the byproduct recovery, coke making process.

Each oven is typically charged with 33.0 tons of coal on a nominal 18 hour batch cycle as part of a continuous process operating 24 hours per day, 365 days per year. When in operation, the rebuilt #5 Coke Oven Battery, on an average, will be charged with 1,300,000 tons per year of coal and will produce 975,000 tons per year of furnace coke (a 75 percent yield as coke).

There will be no increase in the number of the ovens from the original (shutdown) #5 Coke Oven Battery to the rebuilt #5 Coke Oven Battery. Potential coke production capacity of the shutdown battery is the same as the proposed rebuilt battery. During the last few years of operation, however, the shutdown #5 Coke Oven Battery averaged an actual coal charging rate of 906,300 tons per year. Coke production from the shutdown battery during this time averaged 679,725 tons per year (a 75 percent yield as coke).

The proposed reconstruction of the battery itself will include purchase of new "pad up" replacement of the refractory block, all battery castings, oven standpipes, goosenecks and a coke oven gas collector main. The quench tower will also be replaced. A coke-side belted duct collection system to a baghouse collector is proposed for control of coke pushing emissions. The oven doors

will be replaced based upon the battery builder's latest design.

Additionally, the company will make purchases to replace two existing door machines. The coke side door machine removes the door on the coke-side of the oven prior to the pushing operation, cleans the door jamb to assure a tight fit when the door is placed back on the battery, and replaces the door on the battery when the pushing operation is completed. Each of these pieces of ancillary equipment consists of a coke side door removal device, mechanical door and jamb cleaners and a hood which is vented to the pushing emissions control system. Other ancillary equipment the company will purchase includes two new coke guide cars and two new quench cars.

The company plans to use a computerized system to balance fuel gas and air inputs in the oven underfiring system for all operating conditions. This system will be used to maximize the combustion efficiency of blast furnace gas and coke oven gas in the battery and will minimize the emission of products of combustion from the process.

The coal charging larry cars on the shutdown battery were of the staged (sequential) charging design. They utilized four coal hoppers and a charge emissions jumper pipe on the coke-side of the battery. The proposed new battery will use the same design with completely rebuilt larry cars. The new jumper pipes will use water-sealed connections.

The company will reuse the coal and coke handling systems, the pusher machine and the #5 Battery combustion stack. This existing equipment has been inspected and evaluated by an independent contractor who made recommendations on repairs and modifications. These repairs and modifications will be made to the equipment prior to the start-up of the rebuilt battery.

Coke oven gas produced in the battery will be directed to the existing byproduct recovery plant where the volatiles driven from the coal are removed from the coke oven gas. The coke oven gas then passes through an electrostatic precipitator which removes the particulate matter remaining in the coke oven gas. After the gas is cleaned in the electrostatic precipitator, it is directed back to the battery, or another process, which will use this as fuel gas. The blast furnace gas also passes through an electrostatic precipitator prior to being used as a fuel.

A bypass flare is used to prevent overpressurization of the coke oven gas pipeline system. The sulfur dioxide and nitrogen oxides emissions due to the combustion of coke oven gas in the bypass flare are included in the emissions shown for #4 and #5 Batteries in the "netting out" exercises.

Demolition and site preparation work is scheduled to begin on

September 1, 1990, with start-up of the proposed reconstructed facility by November 1, 1992. The project cost, as estimated by the company, is $192,000,000.

Figures 1 through 4, attached at the end of this report, illustrate the various components of a coke oven battery. Figure 1 shows a sectional view of a coke battery from the pusher side of the battery. It shows a general arrangement of the ovens, the vertical flues between the ovens, the charging holes and the gas collection main.

Figure 2 is a detailed cross-section of a coke battery indicating in greater detail the locations of the charging holes and the vertical flues along the length of the oven, the standpipe and the gas collection main.

A drawing of a belted duct-type pushing emission control system is found in Figure 3. This drawing shows a scrubber as the air pollution control device for the emissions. The system proposed by National Steel Corporation is of this type, with a baghouse substituted for the scrubber. A schematic of the pushing emissions control system proposed by National Steel Corporation is shown in Figure 4.

Figure 5 is a drawing of a staged charging larry car. It is similar to that used by National Steel Corporation.

HISTORICAL PERSPECTIVE OF COKE MAKING CAPACITY AT GREAT LAKES STEEL

Great Lakes Steel has produced coke from five batteries on Zug Island. Prior to 1980, #1 Battery and #2 Battery were permanently shutdown. #3 Battery was shutdown in 1982 and #5 Battery was ordered shutdown at the end of 1986. At this time only one battery, #4 Battery, is in operation at Great Lakes Steel. The applicant has proposed shutting down #4 Battery within a year of the start-up of the rebuilt #5 Battery.

During the first year of operation for the rebuilt #5 Battery, the total amount of coal charged to the Great Lakes Steel coke batteries will be limited to 1,300,000 tons per year to ensure that the project "nets out" of U.S.E.P.A. Prevention of Significant Deterioration (PSD) regulations with respect to sulfur dioxide and nitrogen dioxide emissions.

PRESENT AIR QUALITY

The proposed #5 Coke Oven Battery rebuild site is located in an area designated as attainment with respect to the National Ambient Air Quality Standards (NAAQS) for sulfur dioxide,

nitrogen dioxide and lead.

This area is designated nonattainment with respect to the NAAQS for carbon monoxide and ozone, although violations of the carbon monoxide NAAQS have not been recorded in Wayne County since 1984. In addition, special ambient monitoring for carbon monoxide near, and immediately downwind of, Zug Island took place from 1987 to 1989. No violations of the carbon monoxide NAAQS were recorded.

For purposes of New Source Review, the area is considered nonattainment with respect to the primary and secondary NAAQS for particulate matter represented as total suspended particulates.

In 1987, particulate matter 10 microns in diameter and smaller (PM-10) replaced total suspended particulates as the indicator for the particulate matter NAAQS. The attainment status of Wayne County for PM-10 will not be established until the State Implementation Plan (SIP) for the PM-10 NAAQS is completed. This is currently scheduled for 1991.

The Wayne County Air Pollution Control Division has been performing ambient air monitoring for PM-10 in Wayne County since 1986 and currently has seven PM-10 monitoring sites. Violations of the 24-hour PM-10 standard have been recorded at the monitoring site in Southeast Dearborn, where PM-10 monitoring is performed every day. Neither 24-hour nor annual exceedences of the PM-10 standard have been experienced at other monitoring locations, including the site which is closest to the proposed source and is located in the City of River Rouge.

Attachment 1 contains detailed air quality information for Wayne County. A summary of the PM-10 data may be found on the second to last page of Attachment 1. A map of Wayne County indicating the ambient monitoring sites and the location of the proposed source is on the last page of Attachment 1.

SOURCE CHARACTERIZATION

The proposed reconstructed source will have potential uncontrolled emissions in excess of 100 tons per year for each of the following pollutants: particulates, volatile organic compounds (VOCs) and carbon monoxide (CO). Allowable emissions of each of these pollutants will be in excess of 50 tons per year.

Under the State of Michigan Air Pollution Control Commission General Rules R336.1113, Definitions; M., this source would be classified as a "major offset source" because potential emissions of particulate, VOCs and CO would exceed 100 tons per year. Since the area is nonattainment with respect to these pollutants, the most restrictive regulatory requirements applicable are found in

the Michigan Air Pollution Control Commission General Rules R336.1220 and R336.1221 (Rules 220 and 221). These rules address emissions requirements for "Major Offset Sources" of VOC, particulate and CO respectively.

The reconstructed coke battery will also be a major source of sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) emissions and is located in an area designated as attainment for both pollutants. For purposes of the U. S. Environmental Protection Agency's Prevention of Significant Deterioration (PSD) regulations, found in 40 CFR 52.21, the reconstructed source, as a listed source category, will emit both sulfur dioxide and nitrogen oxides at a rate considered significant by these regulations.

A net emissions analysis consisting of contemporaneous increases and decreases was performed to determine if a net significant increase of SO_2 or NO_2 would occur. Based upon the emission records for the company during periods of operation of the original battery, and the limitations in the permit conditions for the rebuilt battery, this project will not result in a significant net emissions increase of SO_2 or NO_2. The "netting out" procedure exempts the proposed rebuild from formal review under the requirements of the PSD regulation and from applying Best Available Control Technology to SO_2 and NO_2 emissions. However, compliance with the Lowest Achievable Emission Rate (LAER) for particulate emissions will reduce the fugitive emissions of SO_2 and NO_2 from the battery.

The proposed rebuilt battery is not considered to be a potential source of lead emissions.

A summary of criteria pollutant emission information is contained in Exhibit 2.

Several non-criteria pollutants are emitted from the coke battery operation. Most of these are emitted from fugitive sources associated with the coking process and are emitted to the atmosphere through leaking coke oven battery components. Requiring the Lowest Achievable Emission Rate for particulate emissions also provides the best known control of these fugitive non-criteria pollutant emissions.

Three identifiable and quantifiable non-criteria pollutants for which emission estimates are available have been evaluated for potential air quality impact. These pollutants are: ammonia, benzene and benzene soluble organics (BSO) of which benzo-a-pyrene is an important component. Ammonia is considered an irritant, while benzene and benzene soluble organics are carcinogens. The benzo-a-pyrene (BaP) fraction of benzene soluble organics is the largest single carcinogenic component of BSO. It is quantified in accordance with the Great Lakes Governor's Agreement. A summary of non-criteria pollutant

information is contained in Exhibit 3.

COMPLIANCE STATUS

Prior to the issuance of a permit for a major offset source under Michigan Air Pollution Control Commission Rules 220 and 221, all existing sources in Michigan that are owned or operated by the owner or operator of the proposed source must be in compliance with applicable local, state and federal air pollution control rules, or in compliance with a legally enforceable schedule to achieve compliance.

Similarly, the Wayne County Air Pollution Control Ordinance Section 404(D)(10) requires that all emission sources in Wayne County that are owned or operated by the owner or operator of the proposed source be in compliance with the ordinance itself or orders or permits issued under the ordinance.

A detailed explanation of the compliance status of all sources owned by National Steel Corporation located in Michigan is contained in Attachment 2.

Additionally, the source is subject to National Emission Standards for Hazardous Air Pollutants (NESHAPs) regulations for benzene emissions from coke oven byproduct recovery plants. These regulations, found in 40 CFR 61 Subpart L, were published as a final rule on September 14, 1989, with that also being the effective date. The regulations allow an affected facility to request an extension of the final compliance deadline for a period which cannot exceed two years.

Great Lakes has requested a two year extension for compliance with the NESHAPs regulations deadline. This request, if approved, will require compliance with the NESHAPs regulations by September 14, 1991. With a projected start-up date in 1992, the applicant must be in compliance with the NESHAPs regulations prior to the start-up of the rebuilt battery.

In addition to the compliance requirements, the permits for the rebuild of #5 Coke Oven Battery will not be issued until: 1)the public comment period has expired, 2)there has been full consideration of any comments submitted during the public comment period and 3)the project is approved by the Michigan Air Pollution Control Commission.

SOURCE EMISSIONS AND CONTROL OF CRITERIA POLLUTANTS

PARTICULATE EMISSIONS

Total Suspended Particulate

This coke oven battery is located in a nonattainment area for the particulate matter standard as represented by total suspended particulates. Since the potential emissions of particulates would exceed 100 tons per year, this source would be classified as a "major offset source". Conditions for approval of this installation under Michigan Rule 221 require compliance with the Lowest Achievable Emission Rate (LAER) for this source type, and emission reductions (offsets) at a ratio of 1.2 to 1 from the complying fraction of emissions from existing sources (Reasonably Available Control Technology, or RACT, emissions). If offsets are obtained from fugitive emission sources, such offsets must be provided in the ratio of 1.5 to 1.

To determine compliance with LAER requirements the U.S.E.P.A. publication BACT/LAER Clearinghouse - A Compilation of Control Technology Determinations was used. Numerous conversations with staff at U.S.E.P.A., Region V, confirmed that the emission standards detailed below for the proposed rebuild at National Steel Corporation are at least as stringent as the standards applied to, or agreed to, by the most recently approved LAER permit for the coke oven battery to be built by Weirton Steel in Weirton, West Virginia. No other existing coke battery has achieved, in practice, emissions lower than these standards.

Particulate emission will be emitted from five categories of coke battery operations: 1)Charging, 2)Door Leaks, 3)Coke Pushing, 4)Quenching and 5)the Combustion Stack. Each of these operations, as well as fugitive emissions from the standpipes and charging lids, have LAER limitations which apply.

1) Charging Emissions

The LAER standard for charging limits visible emissions to no more than 55 seconds for 5 charges. The permit conditions, found in Attachment 3, require compliance with the LAER standard for charging. Using emission factors found in U.S.E.P.A. document AP-42, the estimated particulate emissions from the rebuilt battery due to charging will be 5.7 tons per year.

2) Door Leak Emissions

Door leaks are limited to occur on no more than five percent of the doors by the LAER standard. The permit conditions limit door leakage to five percent of the doors, not including the last oven charged. The estimated particulate emissions from the rebuilt battery due to door leakage, based upon the AP-42 emission factor, will be 17.6 tons per year.

3) Coke Pushing Emissions

An emission rate equivalent to 0.02 pounds of particulate per ton of coke pushed from the pushing emission control system is required by the LAER standards. The emissions from the pushing emission control system stack of the rebuilt battery will be

limited by permit condition to 0.02 pounds per ton of coke and 9.7 tons per year.

A permit condition limits the opacity at the stack of the baghouse serving the pushing emission control system to fifteen percent on a six reading average during the pushing operation. The instantaneous opacity limitation for fugitive emissions during the push and travel operations is restricted to twenty percent by permit condition. Both opacity limitations are considered LAER.

4) Quenching Emissions

The quench tower will be equipped with interior baffles and will use "clean" water. Clean water is defined in AP-42 as water with a total dissolved solids content which does not exceed 800 milligrams per liter. Particulate emissions from the quench tower of the rebuilt battery are estimated to be 351.0 tons per year.

Permit conditions require that the baffles in the quench tower be kept in a good state of repair and that the total dissolved solid content in the quench water not exceed 800 milligrams per liter. The use of recycled water from the byproduct recovery plant in the quench tower is prohibited by permit condition.

5) Combustion Stack

The LAER standard for the combustion stack is 0.012 grains per dry standard cubic foot (DSCF). Combustion stack emissions are limited to 0.012 grains per DSCF, excluding sulfates, and 112.6 tons per year by permit conditions. Additionally, the opacity from the combustion stack is limited, by permit condition, to twenty percent on a six-minute average.

6) Standpipes

LAER requirements limit standpipe leakage to no more than four percent of all standpipes. A permit condition requires compliance with the LAER standard for standpipe leakage. Particulate emission factors for standpipes are not available, thus an estimate of the emissions from the rebuilt battery due to standpipe leakage was not possible.

7) Charging Lids

Visible emissions from charging lids is limited by LAER, and permit condition, to occur from no more than one percent of all lids. An estimate of the particulate emissions from the rebuilt battery due to leaking charging lids was not possible due to the lack of emission factors.

Because the expected particulate emissions are greater than 100 tons per year, Rule 221 applies. Rule 221 requires that particulate emissions be offset at a ratio of at least 1.2 to one

when using stack (process) emissions and at a ratio of at least 1.5 to one when using fugitive emissions. The company must also demonstrate reasonable further progress towards attaining the particulate air quality standard. The coke battery operations considered to be fugitive sources of emissions are charging and door leaks. Pushing, quenching and combustion stack emissions are considered to be stack (process) emissions.

The following tables compare the lowest of the actual or RACT particulate emissions from the original battery with the estimated emissions from the rebuilt battery by specific coke battery operation. Attachment 4 contains detailed particulate emission calculations for both the original battery and the rebuilt battery.

Fugitive Sources	Original	Proposed
Charging	7.2 tons/year	5.7 tons/year
Doors	29.4 tons/year	17.6 tons/year
Total (fugitive)	36.6 tons/year	23.3 tons/year

Process Equipment (Stack Sources)	Original	Proposed
Pushing	11.9 tons/year	9.7 tons/year
Quenching	589.1 tons/year	351.0 tons/year
Combustion Stack	268.4 tons/year	112.6 tons/year
Total (process)	869.4 tons/year	473.3 tons/year

Using the process emissions from the original battery to offset both the process and fugitive emissions from the rebuilt battery results in an offset ratio of 1.75 to one. Therefore, the process emissions of particulate from the original battery are sufficient to offset all of the estimated emissions from the rebuilt battery.

PM-10

The attainment status of Wayne County for PM-10 is not yet established. As a result, the project is subject to the PSD regulations for PM-10 emissions. The PSD regulations allow a net significant increase of less than fifteen tons per year for PM-10 emissions before a formal review is required. Data submitted by the applicant shows that a net significant decrease in PM-10 emissions will occur when the PM-10 emissions from the original battery, rebuilt battery, all sources permitted during the past

five years and all sources which were shutdown during the past five years are considered.

The "netting out" procedure exempts the applicant from applying Best Available Control Technology (BACT) to control PM-10 emissions. However, LAER requirements for particulate emissions also provide the best known control for PM-10.

The coke battery operations which are sources of PM-10 emissions are: 1)Charging, 2)Door Leaks, 3)Coke Pushing, 4)Quenching, 5)the Combustion Stack, 6)Standpipes and 7)Charging Lids.

1) Charging Emissions

When the PM-10 emissions from the rebuilt battery due to charging were estimated the LAER requirements for particulate were considered. The estimated PM-10 emissions from the rebuilt battery due to charging will be 2.8 tons per year.

2) Door Leak Emissions

The LAER requirements for particulate were also considered when estimating PM-10 emissions from the rebuilt battery due to door leakage. The PM-10 emissions from the rebuilt battery due to door leakage are estimated to be 12.0 tons per year.

3) Coke Pushing Emissions

The PM-10 emissions from the rebuilt battery due to the pushing operation are estimated to be 8.4 tons per year when the LAER standards for particulate are considered.

4) Quenching Emissions

PM-10 emissions due to quenching from the rebuilt battery are estimated to be 34.4 tons per year when the LAER standard limiting the quench water total dissolved solids content to no more than 800 milligrams per liter is considered.

5) Combustion Stack

Combustion stack PM-10 emissions from the rebuilt battery are estimated to be 108.0 tons per year, based upon the LAER standard for particulate of 0.012 grains per DSCF and the size specific data contained in AP-42.

6) Standpipe

Although standpipe leakage is a source of PM-10 emissions, an estimate of the PM-10 emissions was not possible due to the lack of emission factors. The LAER control technology for particulate, which will be applied to the rebuilt battery, represents the best control of PM-10 emissions from standpipes.

Leaking charging lids are also a source of PM-10 emissions. No particulate or PM-10 emission factors are available, therefore quantification of the PM-10 emissions due to leaking charging lids on the rebuilt battery was not possible. Particulate

emissions from the rebuilt battery are restricted to the LAER standard by a permit condition. The LAER standard for particulate emissions due to leaking charging lids will result in the minimization of PM-10 emissions.

The total PM-10 emissions from the rebuilt battery are estimated to be 165.6 tons per year.

Because the facility is located in an attainment area for several criteria pollutants, the facility is entitled to consider the total change in emissions at the facility when deciding whether they can "net out" of PSD requirements. A determination must then be made as to whether the Zug Island plant should be considered alone, or in combination with the Main Plant in Ecorse.

Great Lakes Steel's Zug Island and Main Plants are connected by a rail line which is used to transport molten iron from the blast furnaces to the basic oxygen process shop.

On May 16, 1980, EPA determined that two facilities which are separated by 1.8 miles of pipeline should be considered "adjacent" if they operated as one facility. Since the pipeline was used to transport intermediary products from one site to another and neither site produced finished products independently, EPA decided that the two facilities should be considered a single source for purposes of the PSD regulations. For further details please refer to PSD determination PSD/109.

In another case involving two automotive plants which were programmed together, had a dedicated railway service between them, but were located a mile apart, EPA decided that the two plants should be considered as one source for the purposes of the PSD regulations.

In the latter instance, EPA stated that there are three criteria which define a source under the PSD regulations: 1) Common Industrial Grouping, 2) Common ownership or control and 3) Contiguous or adjacent sites. The automobile plants met the first two criteria, without argument. With respect to the third criteria, EPA decided that because of the unique arrangement of the facilities they should be considered adjacent, and thus one site, for the purposes of the PSD regulations. Please refer to PSD determination PSD-129 issued on June 30, 1981, for further details.

Based upon the two PSD determinations mentioned above, the two Great Lakes Steel plants were considered as one site for the purposes of the PSD regulations. A summary of the deletions and additions of PM-10 emissions at the plant during the past several years is shown below as part of the "netting out" exercise. Detailed PM-10 emission calculations for the original battery and

the rebuilt battery are located in Attachment 4.

Additions

Source	Allowed Emissions (TPY)
No. 5 Battery (rebuilt)	165.6
Zug Island Package Boilers	5.8
Total Additions	171.4

Deletions

Source	Allowed Emissions (TPY)
No. 5 Battery (old)	481.5
Sinter Plant	1403
Zug Island Boilerhouse Boiler #6	1.5
Total Deletions	1886.0

A comparison of the total additions and total deletions of PM-10 emissions from the plant shows that a net decrease of 1714 tons per year would occur. Therefore, the project "nets out" of the requirement for formal PSD review and the subsequent PSD requirements of 40 CFR 52.21 for PM-10 emissions.

SULFUR DIOXIDE EMISSIONS

#5 Coke Oven Battery is located in an attainment area for sulfur dioxide. Since Wayne County is an attainment area for sulfur dioxide, the requirements of the PSD regulations must be considered. A net significant increase of less than forty tons per year of sulfur dioxide is allowed by the PSD regulations before a formal review is required.

Based upon the two PSD determinations mentioned above, the two Great Lakes Steel plants were considered as one site for the purposes of the PSD regulations. Therefore, the sulfur dioxide emissions due to the combustion of all of the coke oven gas produced in the original and rebuilt batteries must be considered in the "netting out" exercise.

Information submitted by the applicant shows that a net significant decrease in sulfur dioxide emissions will occur when the sulfur dioxide emissions from the original battery, rebuilt

battery and all sources located at the Zug Island and Main Plants which were either permitted or shutdown during the past five years are considered. Therefore, the project again "nets out" of a formal PSD review and is exempt from applying Best Available Control Technology to control sulfur dioxide emissions.

Two coke battery operations are sources of sulfur dioxide emissions: Charging and the Combustion Stack. Most of the sulfur dioxide emissions are emitted from the combustion stack.

Some control of sulfur dioxide emissions from the charging operation is provided by complying with the LAER standards for particulate. The estimated sulfur dioxide emissions due to the charging operation for the rebuilt battery are 0.24 tons per year.

The primary fuel proposed for the rebuilt battery will be blast furnace gas. However, the battery will burn coke oven gas when coke oven gas consumers located at the Main Plant are down for maintenance. During this period the fuel gas supplied to the rebuilt battery could potentially consist of 100 percent coke oven gas. Coke oven gas heat input to #5 Coke Oven Battery is limited by Michigan SIP Revision No. 8-1988 to 9.2×10^9 BTU per day.

An hourly average heat input for coke oven gas based upon the SIP revision limitation results in a sulfur dioxide emission rate from the combustion stack of 544.6 pounds per hour. This same emission limitation is reflected in the permit conditions found in Attachment 3. A permit condition also reiterates the SIP revision limitation regarding daily coke oven gas heat input to the battery.

Although the battery could be fired by 100 percent coke oven gas from time to time, coke oven gas will not account for more than 85% of the annual heat input to the battery. Sulfur dioxide emission limitations contained in the permit conditions restrict emissions from the combustion stack to 2033 tons per year. The permit conditions also restrict the coke oven gas consumption in the rebuilt battery to 85% of the annual heat input and require that records of the fuels fired in the rebuilt battery be kept on file.

Michigan SIP Revision No. 8-1988 limits the H_2S content of any fuel gases used at Great Lakes Steel to 2.64 grains per DSCF. The hourly and annual sulfur dioxide emission limitations are based upon this limitation. Therefore, compliance with the 2.64 grains per DSCF limitation is also required by permit condition.

The annual emission limitation represents the maximum emission from the combustion stack which would be expected at the end of the rebuilt battery's life when the coke oven gas consumption in

the battery will approach 85% of the annual heat input. In the meantime, coke oven gas produced by the rebuilt battery which will not be consumed in the battery will be used in several operations located at the Main Plant.

The following tables summarize the additions and deletions of sulfur dioxide emissions at Great Lakes Steel during the past several years. The emissions shown for the original and rebuilt batteries include the emissions due to the combustion of coke oven gas which was or will be produced in #5 battery and consumed elsewhere in the Great Lakes Steel operations. Detailed sulfur dioxide emission calculations for the original and rebuilt #5 battery are located in Attachment 4.

Additions

Source	Allowed Emissions (TPY)
No. 5 Battery (rebuilt)	5076
Zug Island Package Boilers	1
Burnout Oven BB-55A	0.004
Burnout Oven BB-288	0.13
Total Additions	5077.134

Deletions

Source	Allowed Emissions (TPY)
No. 5 Battery (old)	3539
Zug Island Boilerhouse 1 Boiler #6	0*
Sinter Plant	544**
No. 4 Battery	1620***
Total Deletions	5703

* Sulfur dioxide emissions from boiler #6 were due to the combustion of coke oven gas. All emissions due to coke oven gas combustion are included in the emissions shown for the two coke batteries.

** Sulfur dioxide emissions from the sinter plant were due to the combustion of coke.

*** Complete shutdown of #4 Battery will not occur until late 1993. During the period between the startup of the rebuilt #5 Battery and the complete shutdown of #4 Battery the total coal consumption in the two batteries will be restricted to assure that the project "nets out" of the PSD regulations during the interim period.

A comparison of the figures for the total additions and total deletions in sulfur dioxide emissions shows that a net decrease of 626 tons per year will occur. The project "nets out" of the requirement for formal PSD review and the subsequent PSD requirements of 40 CFR 52.21 for sulfur dioxide emissions.

CARBON MONOXIDE EMISSIONS

The proposed location is in a nonattainment area for carbon monoxide. Michigan Air Pollution Control Commission Rules do not require offset emissions for major sources of carbon monoxide.

Carbon monoxide will be emitted from four categories of coke battery operations: Charging, Door Leaks, Pushing, and the Combustion Stack, with most of the carbon monoxide emissions coming from the combustion stack.

The LAER standard for particulate emissions from the charging operation also reduces the carbon monoxide emissions by reducing the amount of time charging emissions are allowed. The estimated carbon monoxide emissions due to charging from the rebuilt battery are 7.15 tons/year.

Some control of carbon monoxide emissions from the charging operation is provided by complying with the LAER standard for door leakage. Carbon monoxide emissions due to door leakage from the rebuilt battery are estimated to be 19.5 tons/year.

The belted duct type pushing emission control system will not reduce the carbon monoxide emissions from the pushing operation. The estimated carbon monoxide emissions from the rebuilt battery due to the pushing operation will be 45.5 tons/year.

No add-on control of carbon monoxide emissions from the combustion stack is proposed, although carbon monoxide emissions will be minimized by the computer aided underfiring system which will optimize the combustion efficiency in the coke oven battery.

Permit conditions for rebuilt #5 battery limit carbon monoxide concentration in the exhaust gases from the combustion stack to 0.0788 percent by volume, 437.4 pounds per hour and 1916 tons per year. These limitations are based upon a June, 1989, stack test on the combustion stack of a battery fired on coke oven gas. These restrictions represent an overestimate of the actual carbon monoxide emissions because the emissions estimate was based upon operating 8760 hours per year (100%) using coke oven gas, while a permit condition restricts coke oven gas usage to 85% of the annual heat input to the rebuilt battery.

Including the overestimate of the combustion stack emissions, the total estimated carbon monoxide emissions from the rebuilt battery will not exceed 1994 tons per year. A permit condition limits the carbon monoxide emissions from the rebuilt battery to 455.2 pounds per hour and 1994 tons per year.

Since the proposed source will be located in a nonattainment area for carbon monoxide, federal PSD regulations do not apply. Michigan rules do not require offsets for major sources of carbon monoxide. However, Great Lakes Steel will experience a plantwide reduction in carbon monoxide emissions. The following table compares the average carbon monoxide emissions from the Zug Island and Main Plants for the years 1985 and 1986 with the expected emissions from each plant after the start-up of the rebuilt #5 Battery.

Plant	Average Emissions 1985 - 1986 (TPY)	Projected Emissions 1993 (TPY)	Change (TPY)
Main	7,419	7,567	+ 148
Zug Island	20,210	2,267	- 17,943
Total	27,629	9,834	- 17,795

The projected emissions of carbon monoxide from the Zug Island and Main Plants will be 17,795 tons/year lower in 1993 than the average emissions from the two plants for 1985 and 1986. This reduction is due primarily to the permanent shutdown of the sinter plant at the end of 1988.

VOLATILE ORGANIC COMPOUND EMISSIONS

The proposed #5 battery rebuild is located in a nonattainment area for volatile organic compounds (VOCs). With potential emissions of VOCs greater than 100 tons per year, the rebuilt battery is considered a major source. Therefore, Michigan Air Pollution Control Commission Rule 220, which requires offsetting emissions of volatile organic compounds at a rate of 110 percent of the proposed emissions, applies to the project.

EPA publications list the following sources of volatile organic compound emissions from the coke battery process: Charging, Door Leaks and Pushing.

The LAER standard for particulate emissions reduces the amount of time charging emissions are allowed. Compliance with the particulate standard is the best known control technology for reducing emissions of volatile organic compounds during the charging operation. The estimated volatile organic compound emissions from the rebuilt battery due to charging will be 29.9

tons per year.

Door leakage is limited to no more than five percent of the doors by the LAER requirements for particulate. The LAER requirement for particulate provides some control of volatile organic compound emissions due to door leakage. Volatile organic compound emissions from the rebuilt battery due to door leakage are estimated to be 48.8 tons per year.

Volatile organic compound emissions from pushing will not be controlled or reduced by the belted duct-type pushing emission control system. VOC emissions from pushing are dependent upon how thoroughly the coal is coked. A thorough coking of the coal is reflected in a low volatile matter content in the coke pushed. It is expected that the rebuilt battery will thoroughly coke the coal, driving off practically all organics present in the charged coal. This will result in a residual volatile matter content of approximately 0.94 percent, by weight, in the coke pushed. The organics which are driven off are carried in the coke oven gas to the byproduct recovery plant.

Permit conditions require that the volatile matter content of daily composite samples of the coke produced in the rebuilt battery be measured and recorded with a maximum limit of 0.94 percent, by weight, on an annual basis. The VOC emissions from the rebuilt battery due to pushing operations are estimated to be 110.1 tons per year.

The total volatile organic compound emissions from the rebuilt battery are estimated to be 188.8 tons per year.

The following table compares the actual or RACT, whichever is lowest, volatile organic compound emissions from the original battery with the estimated emissions from the rebuilt battery for specific coke battery operation. Detailed volatile organic compound emission calculations for both the original battery and the rebuilt battery are located in Attachment 4.

Source	Original	Proposed
Charging	37.6 tons/year	29.9 tons/year
Door Leaks	81.6 tons/year	48.8 tons/year
Pushing	90.6 tons/year	110.1 tons/year
Total	209.8 tons/year	188.8 tons/year

When the total emissions from the original battery and the rebuilt battery are compared, the emissions from the original battery are 1.11 times (or 111 percent) of the emissions from the rebuilt battery. Therefore, the emissions from the original battery are sufficient to offset the emissions from the rebuilt battery.

NITROGEN DIOXIDE EMISSIONS

The proposed location is in an attainment area with respect to the National Ambient Air Quality Standards for nitrogen dioxide, therefore the requirements of the PSD regulations must be considered. The PSD regulations allow a net significant increase of less than forty tons per year of nitrogen dioxide emissions before a formal PSD review is required.

Information submitted by the applicant shows that a net significant decrease in nitrogen dioxide emissions will occur when the nitrogen dioxide emissions from the original battery, rebuilt battery and all sources located at the Zug Island and Main Plants which were either permitted or shutdown during the past five years are considered. Therefore, the project "nets out" of a formal PSD review and is exempt from applying Best Available Control Technology to nitrogen dioxide emissions.

Three coke battery operations are sources of nitrogen dioxide emissions: Charging, Door Leaks and the Combustion Stack. Most of the nitrogen dioxide emissions are emitted from the combustion stack.

Some control of nitrogen dioxide emissions from the charging operation is provided by complying with the LAER standards for particulate. The estimated nitrogen dioxides emissions due to the charging operation for the rebuilt battery are 0.4 tons per year.

The LAER standard for the control of particulate emissions due to door leakage is the best known control technology for nitrogen oxides emissions from door leaks. Emissions of nitrogen oxides from the rebuilt battery due to door leakage are estimated to be 0.3 tons per year.

Although the battery will burn coke oven gas when coke oven gas consumers located at the Main Plant are down for maintenance, the primary fuel proposed for the rebuilt battery is blast furnace gas. When the coke oven gas consumers at the Main Plant are down for maintenance, the fuel gas supplied to the rebuilt battery could potentially consist of 100 percent coke oven gas.

The flame temperature for coke oven gas combustion is much higher than the flame temperature for blast furnace gas. A higher flame temperature results in greater fixation, and greater emissions, of nitrogen oxides from the combustion process.

Based upon stack test results for a battery fired by coke oven gas, the emissions of nitrogen oxides from the combustion stack of the rebuilt battery are estimated to be 672 tons per year.

This estimate assumes that the rebuilt battery will be fired by coke oven gas 8760 hours per year. Since the permit conditions, found in Attachment 3, limit the annual coke oven heat input to #5 Battery to 2.85×10^{12} BTU per year (85% of the maximum annual heat input), this is an overestimate of the actual emissions.

Although the battery could be fired by 100 percent coke oven gas, coke oven gas will not account for more than 85% of the annual heat input to the battery. Michigan SIP Revision No. 8-1988 and the permit conditions limit the coke oven gas heat input to #5 Coke Oven Battery to 9.2×10^{9} BTU per day.

An hourly average heat input for coke oven gas based upon the SIP revision limitation results in a nitrogen oxides emission rate from the combustion stack of 153.4 pounds per hour. This emission limitation may be found in the permit conditions along with a reiteration of the SIP restriction on the daily coke oven gas input to the battery.

The maximum nitrogen oxides emission rate will be 0.4 pounds per 10^{6} BTU regardless of the fuel supplied to the rebuilt battery. Based upon this emission rate, the annual nitrogen oxides emissions from the combustion stack are restricted by permit condition to 672 tons per year.

Total emissions of nitrogen oxides are estimated to be 673 tons per year. This includes the overestimate of nitrogen oxides emissions from the combustion stack.

In accordance with PSD determinations PSD/109 and PSD-129, Great Lakes Steel's Zug Island and Main Plants were considered to be one site for the purposes of the PSD regulations. Therefore, the nitrogen oxides emissions due to the combustion of all of the coke oven gas produced in the original and rebuilt batteries must be considered in the "netting out" exercise.

The following tables summarize the additions and deletions of nitrogen oxides emissions at Great Lakes Steel during the past several years. The emissions shown for the coke oven batteries include the emissions due to the combustion of coke oven gas which was or will be produced in the batteries and consumed elsewhere in Great Lakes Steel operations. Detailed nitrogen oxides emission calculations for the original and rebuilt #5 Battery are located in Attachment 4.

Additions

Source	Allowed Emissions (TPY)
No. 5 Battery (rebuilt)	1431
Zug Island Package Boilers	384

Burnout Oven BB-55A	0.1
Burnout Oven BB-288	0.31
Vacuum Degasser	0.53
Vacuum Degasser Package Boiler	79.3
Total Additions	1895.24

Deletions

Source	Allowed Emissions (TPY)
No. 5 Battery (old)	998
Zug Island Boilerhouse 1 Boiler #6	0*
Sinter Plant	761**
No. 4 Battery	457***
Total Deletions	2216

* Nitrogen oxides emissions from boiler #6 were due to the combustion of coke oven gas. All emissions due to coke oven gas combustion are included in the emissions shown for the two coke batteries.

** Nitrogen oxides emissions from the sinter plant were due to the combustion of coke.

*** Complete shutdown of #4 Battery will not occur until late 1993. During the period between the startup of the rebuilt #5 Battery and the complete shutdown of #4 Battery the total coal consumption in the two batteries will be restricted to assure that the project "nets out" of the PSD regulations during the interim period.

A comparison of the figures representing the total additions and total deletions in nitrogen oxides emissions indicates that a net decrease of 320 tons per year will occur. Therefore, the project "nets out" of the requirements for formal PSD review and the subsequent PSD requirements of 40 CFR 52.21 for nitrogen dioxide emissions.

SOURCE EMISSIONS AND CONTROL OF NON-CRITERIA POLLUTANTS

Emissions estimates were made for four pollutants for which U.S.E.P.A. has not listed standards. These pollutants, called non-criteria pollutants, are Ammonia, Benzene, Benzene Soluble Organics (BSO) and Benzo-a-pyrene (BaP). BaP is a component of BSO and is being quantified, and limited by permit conditions, in accordance with the Great Lakes Governor's Agreement.

AMMONIA EMISSIONS

As a non-criteria pollutant, ammonia is an irritant. Three portions of the coking process are a source of ammonia emissions: Charging, Door Leaks and Pushing.

Compliance with the LAER requirement for the control of particulate emissions from the charging operation represents the best known control strategy for charging emissions of ammonia. This LAER requirement reduces the amount of time that emissions, including ammonia, would be allowed from the charging operation. Ammonia emissions from the rebuilt battery due to charging are estimated to be 0.24 tons per year.

Emissions of ammonia from the rebuilt battery due to door leakage are estimated to be 1.95 tons per year. Once again, the LAER requirement for the control of particulate emissions from door leaks is the best known control strategy for ammonia emissions.

The pushing emission control system will not reduce or control ammonia emissions. Emissions of ammonia from the rebuilt battery due to the pushing operation are estimated to be 65 tons per year.

Total ammonia emissions from the rebuilt battery are expected to be 15.3 pounds per hour and 67.2 tons per year. These estimates are reflected in permit condition limitations. Compliance with the LAER requirements for particulate control will be accepted as a demonstration of compliance with the ammonia emission limitations.

Detailed ammonia emission calculations for the original and rebuilt batteries are located in Attachment 4.

BENZENE EMISSIONS

Benzene is considered to be a carcinogen. Three portions of the coking process are sources of benzene emissions. They are: Charging, Door Leaks and Topside emissions.

The LAER standard for particulate emissions limits the amount of time that emissions, including benzene, are allowed during the charging operation. Emissions of benzene from the rebuilt battery due to charging are estimated to be 5.98 tons per year.

Estimated benzene emissions from door leaks are 0.65 tons per year. Using the LAER standard for particulate emissions from door leaks, which is also the best known control strategy for benzene emissions, no more than five percent of the doors may

leak.

Topsides emissions of benzene, which include emissions from standpipes and charging lids, are estimated to be 0.065 tons per year from the rebuilt battery. The LAER standards for standpipe and charging lid leak rates required for the control of particulate emissions represents the best known control strategy for topside benzene emissions.

The permit conditions limit the fugitive visible emissions from the rebuilt battery during the pushing and travel operations to an instantaneous twenty percent. The coal must be coked very thoroughly, driving off all of the benzene in the coal, to comply with this opacity limitation. The benzene which is driven off is carried by the coke oven gas to the byproduct recovery plant where the coke oven is stripped of benzene and many other chemicals. As a result, the benzene content in the coke pushed from the battery will be extremely low and the benzene emitted during the pushing operation will be nil.

Since very little benzene will be present in the coke produced in the battery, no emissions of benzene will be emitted during the quenching of the coke. The only other potential source of benzene emissions during the quenching operation is the quench water. Permit conditions prohibit the use of recycled water from the byproduct recovery plant. Therefore, the benzene emissions from the quenching operation associated with the rebuilt battery should be nil.

The total benzene emissions from the rebuilt battery, as limited by permit condition, are expected to be 1.53 pounds per hour and 6.7 tons per year. Compliance with the LAER standards will be accepted as a demonstration of compliance with the benzene emission limitations.

Detailed emission calculations for benzene from the original and rebuilt batteries are located in Attachment 4.

BENZENE SOLUBLE ORGANIC EMISSIONS

Benzene soluble organics are organic compounds which are soluble in benzene. One constituent of BSO is benzo-a-pyrene, or BaP. BSO is considered a carcinogen. The six portions of the coke making process which are potential sources of BSO emissions are: Charging, Door Leaks, Pushing, Quenching, Standpipes and Charging Lids.

Benzene soluble organic emissions from the charging operation are minimized by complying with the LAER standard for particulate emissions. The benzene soluble organic emissions due to charging from the rebuilt battery are estimated to be 2.86×10^{-3} tons per

year.

The LAER standard for door leakage restricts the number of leaking doors to five percent of the oven doors. Estimated benzene soluble organic emissions from the rebuilt battery due to door leakage are 0.24 tons per year.

As was the case for benzene, the thorough coking of the coal results in an insignificant level of benzene soluble organics in the coke at the end of the coking cycle. Therefore, the emissions of benzene soluble organics during the pushing operation are expected to be nil.

No benzene soluble organics will be present in the coke during the quenching operation and water from the byproduct recovery plant cannot be used in the quench tower. As a result, benzene soluble organics are not expected to be emitted from the quenching operation.

Standpipe leakage from the rebuilt battery is limited by the LAER standard for particulate emissions to no more than four percent of the standpipes. The estimated emissions of benzene soluble organics from leaking standpipes will be 0.22 tons per year.

The number of leaking charging lids on the rebuilt battery is limited by the LAER standard for particulate emissions to no more than one percent of all charging lids. Benzene soluble organic emissions from leaking charging lids on the rebuilt battery are estimated to be 0.11 tons per year. Compliance with the LAER standards for particulate emissions will be accepted as a demonstration of compliance with the benzene soluble organic emission limitations.

Total benzene soluble organic emissions from the rebuilt battery are expected to be 0.57 tons per year.

BENZO-A-PYRENE EMISSIONS

Benzo-a-pyrene, a significant constituent of BSO, is a carcinogen. Six portions of the coke making process are potential sources of benzo-a-pyrene emissions. They are: Charging, Door Leaks, Pushing, Quenching, Standpipes and Charging Lids.

In response to problems of pollution in the Great Lakes, the governors of the Great Lakes states convened and signed what is known as the Great Lakes Governor's Agreement. This agreement requires emission limitations for seven listed pollutants whenever reasonable. Benzo-a-pyrene is one of the listed pollutants. This agreement also requires the use of toxics best available control technology, or T-BACT, whenever possible. For

coke making, the LAER requirements for particulates is equivalent to T-BACT for benzo-a-pyrene.

The LAER standard for particulate emissions due to the charging operation represents the best known control strategy for all emissions from the charging operation. Benzo-a-pyrene emissions from the charging operation for the rebuilt battery are estimated to be 2.86×10^{-5} tons per year.

Door leakage is restricted by the LAER standard for particulate emissions to no more than five percent of the doors. This standard also reduces the benzo-a-pyrene emissions due to door leaks. The benzo-a-pyrene emissions from the rebuilt battery due to door leaks are estimated to be 2.4×10^{-3} tons per year.

Benzo-a-pyrene emissions from the pushing operation of the rebuilt battery are expected to be very insignificant. BaP emissions from the pushing operations are related to the volatile matter content in the coke pushed. To attain a low value of volatile matter in the coke, the coal must be coked very thoroughly. A thorough coking of the coal drives off practically all organics present, including BaP, in the charged coal. The organics which are driven off are carried in the coke oven gas to the byproduct recovery plant. A permit condition restricts the volatile matter content in the coke produced in the rebuilt battery to 0.94 percent, by weight, on an annual basis, based upon daily composite samples of the coke.

Since practically all of the organics are driven off during the coking cycle and directed to the byproduct recovery plant in the coke oven gas, the benzo-a-pyrene content of the coke during the quenching operations should also be insignificant. Furthermore, a permit condition prohibits the use of water from the byproduct recovery plant in the quench tower. No emissions of benzo-a-pyrene should be emitted from the quenching operation of the rebuilt battery since neither the coke nor the quench water will contain benzo-a-pyrene.

Standpipe emissions are limited by the LAER standard for particulate emissions to visible emissions from no more than four percent of all standpipes. Estimated benzo-a-pyrene emissions from the standpipes of the rebuilt battery are 0.0022 tons per year.

The LAER standard for particulate emissions from the charging lids of the rebuilt battery limit visible emissions to no more than one percent of the charging lids. Benzo-a-pyrene emissions from the rebuilt battery due to leaking charging lids are estimated to be 0.0011 tons per year.

Total benzo-a-pyrene emissions from the rebuilt battery are estimated to be 0.0057 tons per year. Compliance with the LAER

standards for particulate emissions will be accepted as a demonstration of compliance with the benzo-a-pyrene emission limitations.

CRITERIA AND NON-CRITERIA EMISSION IMPACTS

Since the proposed battery contains fugitive and stack emissions of criteria and non-criteria pollutant emissions, two mathematical dispersion models were used to estimate the emission impacts. Each model was matched to the emission characteristics to produce the most accurate estimate of the emissions impact.

Stack emissions from the battery's combustion stack were modelled as a point source using the Industrial Source Complex Short Term (ISCST) model. Fugitive, non-criteria emissions were modelled as a line source using the Buoyant Line and Plume (BLP) model. Fugitive emissions of criteria pollutants were modelled as a volume source with ISCST. Both ISCST and BLP models were run by the applicant's modelling consultant, ENSR Consulting & Engineering, Inc. The results of the model analyses were verified by Division staff. Both models used urban data from the nearest approved location, Detroit Metropolitan Wayne County Airport. The urban and rural versions of ISCST and the rural version of BLP have been approved by the U.S.E.P.A. Approval of the urban version of BLP is expected shortly.

The table located at the end of this section lists the maximum impacts of the criteria and non-criteria pollutants.

For criteria pollutants, the following report can be made:

Total Suspended Particulates

The proposed source is located in a designated primary nonattainment area for total suspended particulates and a designated Class I area for PM-10. The maximum 24-hour and annual ground level impacts from the #5 coke battery rebuild are 34.15 ug/m^3 and 4.33 ug/m^3, respectively. The maximum 24-hour and annual ground level impacts from the original #5 coke battery were 64.8 ug/m^3 and 8.21 ug/m^3, respectively. Emission impacts from the proposed #5 battery rebuild are in excess of the allowable NAAQS impacts of 5 ug/m^3 (24-hour) and 1 ug/m^3 (annual). These limits are applicable to a new source located in a nonattainment area. However, when the impacts from the proposed source are looked at in conjunction with the reduced impact from the shutdown of the original source, there will be a net air quality benefit. There will also be an overall net reduction of total suspended particulates at the facility due to shutdown of other sources.

PM-10

The maximum 24-hour and annual ground level impacts of PM-10 from the proposed #5 coke battery rebuild are 7.76 ug/m^3 and 0.98 ug/m^3, respectively. The maximum impacts from the original battery were 44.3 ug/m^3 (24-hour) and 5.6 ug/m^3 (annual). Emissions from the proposed source are in excess of the levels of significance which are 5 ug/m^3 (24-hour) and 1 ug/m^3 (annual). As was the case with the total suspended particulate impacts, the impact from the proposed source is looked at in conjunction with the reduced impact from the original source. Again, there will be a net air quality benefit. Overall PM-10 emissions will also be reduced due to the shutdown of other sources at the facility.

Sulfur Dioxide

The proposed source is located in an attainment area with respect to sulfur dioxide. As such, the impacts must be compared to the available PSD increment for the area. No new source may consume more than 80% of the remaining available increment. Although the increment in this area has been consumed by other previously permitted sources, the shutdown of sources which were in existence at the time the baseline determination was made, such as #3 battery and the shutdown of #5, will create additional increment. The proposed source must then be compared to the levels of significant increase, which are 5 ug/m^3 (24-hour) and 1 ug/m^3 (annual).

The maximum ground level impact from the original #5 Battery was 27.73 ug/m^3 (24-hour) and 3.53 ug/m^3 (annual), while #3 Battery produced a maximum ground level impact of 29.8 ug/m^3 (24-hour) and 3.56 ug/m^3 (annual). In effect, the shutdown of these two batteries increased the increment by 57.53 ug/m^3 (24-hour) and 7.09 ug/m^3 (annual).

The maximum ground level impacts of sulfur dioxide from the proposed source are 38.92 ug/m^3 (24-hour) and 4.94 ug/m^3 (annual).

Comparing the projected increase from the proposed source with the reduction due to the shutdowns of #3 Battery and the original #5 Battery yields an overall decrease of 18.61 ug/m^3 (24-hour) and 2.15 ug/m^3 (annual).

The overall decrease shown above does not consider the reduction in sulfur dioxide emissions due to the shutdown of #4 Battery and the Sinter Plant. When these reductions are considered the overall reductions in the maximum ground level impact of sulfur dioxide will be even larger than the values shown above.

Carbon Monoxide

The proposed source is located in a nonattainment area with respect to carbon monoxide. The impacts from this source must then be compared to the levels of significance for carbon monoxide. The levels of significance for carbon monoxide are 2000 ug/m^3 (1-hour) and 500 ug/m^3 (8-hour).

The maximum ground level impact of carbon monoxide from the proposed source is 98.2 ug/m^3 (8-hour), while the impact from the original battery is 117.8 ug/m^3 (8-hour). There will be a net air quality benefit when comparing the two sources. The impact is also insignificant when compared to the NAAQS.

Volatile Organic Compounds

The total emissions of volatile organic compounds (VOCs) from the proposed source are 188.8 tons per year. The total VOC emissions from the original source are 209.8 tons per year. There will be a net reduction of 21.0 tons per year of VOCs when the emissions between the two sources are compared.

Since the proposed source is located in an ozone nonattainment area, the provisions of Michigan Rule 220 must be considered. This rule requires that a source with potential VOC emissions greater than 100 tons per year provide emission reduction credits (offsets) in the amount of 110 percent of their VOC emissions as a demonstration of attempting reasonable further progress towards attaining the standard. The company has provided offsets in the amount of 111 percent, which is greater than the required amount.

Nitrogen Oxides

The proposed source is located in an attainment area for nitrogen oxides. The annual impacts from this source must, as such, be compared to the allowable PSD increment, which is 80% of the available remaining increment.

The maximum annual ground level impact of nitrogen oxides from the proposed source is 1.41 ug/m^3 (annual average). This is an acceptable impact when compared to the allowable PSD increment of 20 ug/m^3 (annual), and without taking into account the change in impact from the shutdown of the original source or #4 battery.

NON-CRITERIA POLLUTANTS

For non-criteria pollutants, the estimated impacts were compared with the Acceptable Ambient Concentrations (AAC) as advised by the Michigan Department of Natural Resources, Air Quality

Division.

Coke batteries are emitters of numerous toxic compounds including ammonia, considere non carcinogenic, benzene and organic compounds soluble in benzene (referred to as benzene soluble organics or BSO). Benzene is a known human carcinogen; BSO includes a number of known and potential human carcinogens. Benzo-a-pyrene is included in the class of BSO compounds.

Benzene is a common pollutant emitted by a great variety of sources including cigarette smoke and car exhaust. The Division's random ambient measurements of benzene indicate that it is pervasive and can be detected wherever it is monitored.

Emissions of benzo-a-pyrene result from many combustion processes, specifically incomplete combustion. Leaf burning and cigarette smoke emit benzo-a-pyrene. The principal emitter, however, of BaP in industrial sources is in the manufacture of coke. The Division has been measuring ambient levels of BaP throughout Wayne County for many years and this data may be seen in attachment 1.

The following report can be made with respect to non-criteria pollutants:

Ammonia

The Michigan Department of Natural Resources, Air Quality Division, considers the Acceptable Ambient Concentration (AAC) for non-criteria, non-carcinogenic compounds to be one percent of the Threshold Limit Value (TLV), as determined by the American Conference of Governmental Industrial Hygienists and found in their publication Industrial Ventilation. The TLV for ammonia, found in the Appendix of the 19th edition of this publication, is 18 milligrams per cubic meter. Taking one percent of this value at the property line, the AAC, on an 8-hour average, is 0.18 milligrams per cubic meter or 180 micrograms per cubic meter.

The ISCST and BLP model combination predicted a maximum worst case concentration from the rebuilt battery to be 8.2 micrograms per cubic meter (8-hour average).

Benzene

The Michigan Department of Natural Resources determines the Acceptable Ambient Concentration (AAC) for carcinogenic compounds based upon the annual average concentration to which a person: 1) may be continuously exposed for 70 years, and 2) which will result in an increased cancer risk of one in one million. According to the Michigan Department of Natural Resources, Air

Quality Division, the AAC for benzene is 0.14 micrograms per cubic meter.

The maximum benzene impact predicted by the ISCST-BLP model combination is 0.131 micrograms per cubic meter (annual average). The point of maximum impact is at the company's property line at the No. 3 Ore Dock located on the Detroit River. This impact represents a risk of 0.94 in one million.

Modelling receptors were also located off the property, with a maximum predicted benzene impact, in the surrounding neighborhood, of 0.0171 micrograms per cubic meter. This impact represents a risk of 0.12 in one million.

Benzene Soluble Organics (BSO)

The Michigan Department of Natural Resources, Air Quality Division, has determined that the AAC for benzene soluble organics (BSO) is 0.002 micrograms per cubic meter.

The maximum BSO impact predicted by the ISCST-BLP model combination is 0.011 micrograms per cubic meter (annual average). This impact occurs at the company's property line, at the No. 3 Ore Dock located on the Detroit River. This impact represents a risk of 5.5 in one million.

Modelling receptors were also located off the property, with a maximum predicted BSO impact, off property, of 0.00144 micrograms per cubic meter. This impact represents a risk of 0.72 in one million.

Benzo-a-pyrene (BaP)

The AAC for benzo-a-pyrene, according to the Michigan Department of Natural Resources, Air Quality Division, is 0.3 nanograms per cubic meter based upon an annual average.

The maximum BaP impact predicted by the ISCST-BLP model combination is 0.17 nanograms per cubic meter (annual average). The maximum BaP impact represents an increased risk of 0.557 in one million. As a constituent of BSO, the risk attributable to BaP has been accounted for, and included, in the risk assessment for BSO.

Total Risk

By adding the ground level impacts of benzene and BSO that were estimated by the BLP dispersion model, the maximum number of excess cancer incidents was estimated at locations along the

applicant's property line and beyond. The maximum combined risk associated with the non-criteria emissions of benzene and BSO from the rebuilt battery is predicted to be 6.4 in one million. This risk is located at the company's property line, near the No. 3 Ore Dock.

The maximum combined risk beyond the company's property line, in the neighborhood surrounding the facility, is 0.84 in one million.

When determining the risks associated with the proposed source, the reduction in risks from the shutdown of the original source and #4 Battery was not taken into consideration. As such, the risk from the proposed source will be offset by the reduction in risk from the shutdown of those sources. It is expected that there will actually be a net decrease in risk levels associated with the facility.

One area that was investigated is the estimated excess cancer risks from emissions from coke oven batteries that have been published by the U.S.E.P.A. Some of these estimates are as high as 1 in ten thousand. The applicant's modelling consultant supplied information to the Division describing the methods used by the EPA in developing their conclusions on the risks from coke oven batteries. The Division verified significant aspects of this information through conversations with modelling experts at the EPA.

The EPA performed risk estimates from coke oven batteries for the purposes of developing the coke oven emission standards under the federal National Emissions Standards for Hazardous Air Pollutants, or NESHAPS. In the EPA's risk analysis, the batteries were treated as volume sources, emitting pollutants without considering the significant effects of buoyancy. Use of the BLP model corrects this inaccuracy by applying a buoyancy term to the emissions and assumes the fugitive emissions are represented as a line source. This model more accurately estimates the emissions from the battery.

According to the EPA, they were aware of the inaccuracies that are produced by using volume source calculations by correcting this deficiency through use of the BLP model was too resource intensive.

In addition, the EPA risk estimate included an emission inventory that assumed Reasonably Available Control Technology (RACT) whereas the applicant's battery is controlled to LAER.

Modeling of Criteria and Non-criteria Pollutants

POLLUTANT	Emission (Lb/Hr)		Max. Impact ($\mu g/m^3$)		AAC ($\mu g/m^3$)
	Original	Proposed	Original	Proposed	
TSP	215.8	113.8	88.90 12.60	46.89 6.64	5* 1**
PM-10	112.9	37.8	46.52 6.60	15.57 2.21	5* 1**
SO2	424.5	544.5	30.34 3.86	38.92 4.94	5* 1**
CO	518.2	455.3	117.8	98.2	500***
NO2	119.9	153.6	1.1	1.4	20**
VOL ORGANICS	50.8	43.1			
AMMONIA	11.9	15.3	6.4	8.2	180***
BENZENE	2.84	1.53	0.242	0.131	0.14**
BENZENE SOLUBLE ORGANICS	7.7	0.13	0.6	0.011	0.002**
BENZO(a)PYRENE	0.077	0.0013	0.006	0.00011	0.0003**

* Avg. Time 24 hrs.
** Avg. Time Annual.
*** Avg. Time 8 hrs.

RECOMMENDATION

Staff finds that the rebuilt No. 5 Coke Oven Battery, when reconstructed as described and operated in compliance with the proposed permit conditions in Attachment 3, should meet all applicable U.S.E.P.A., Michigan Air Pollution Control Commission and Wayne County Air Pollution Control Division rules and regulations, and will not endanger the public health or welfare, nor will it adversely affect the environment.

Therefore, staff recommends the Michigan Air Pollution Control Commission authorize approval of Wayne County Installation Permit Nos. C-6426 and C-7070 and Michigan Department of Natural Resources Permit To Install No. 650-88 subject to the attached permit conditions unless new information regarding air quality issues is received during the public comment period and/or publc hearing.

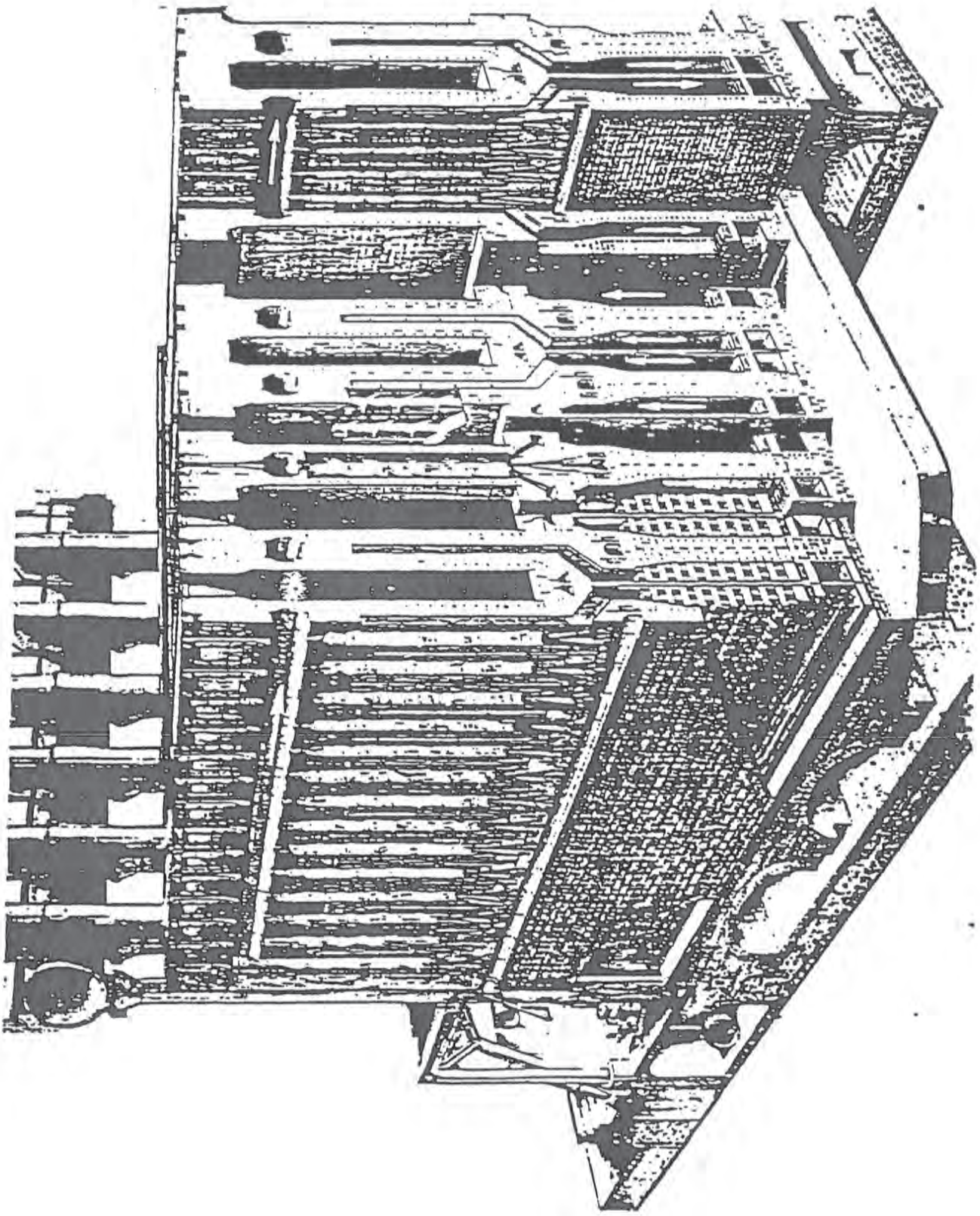


FIGURE 1 - Sectionalized view of a coke battery from the pusher side

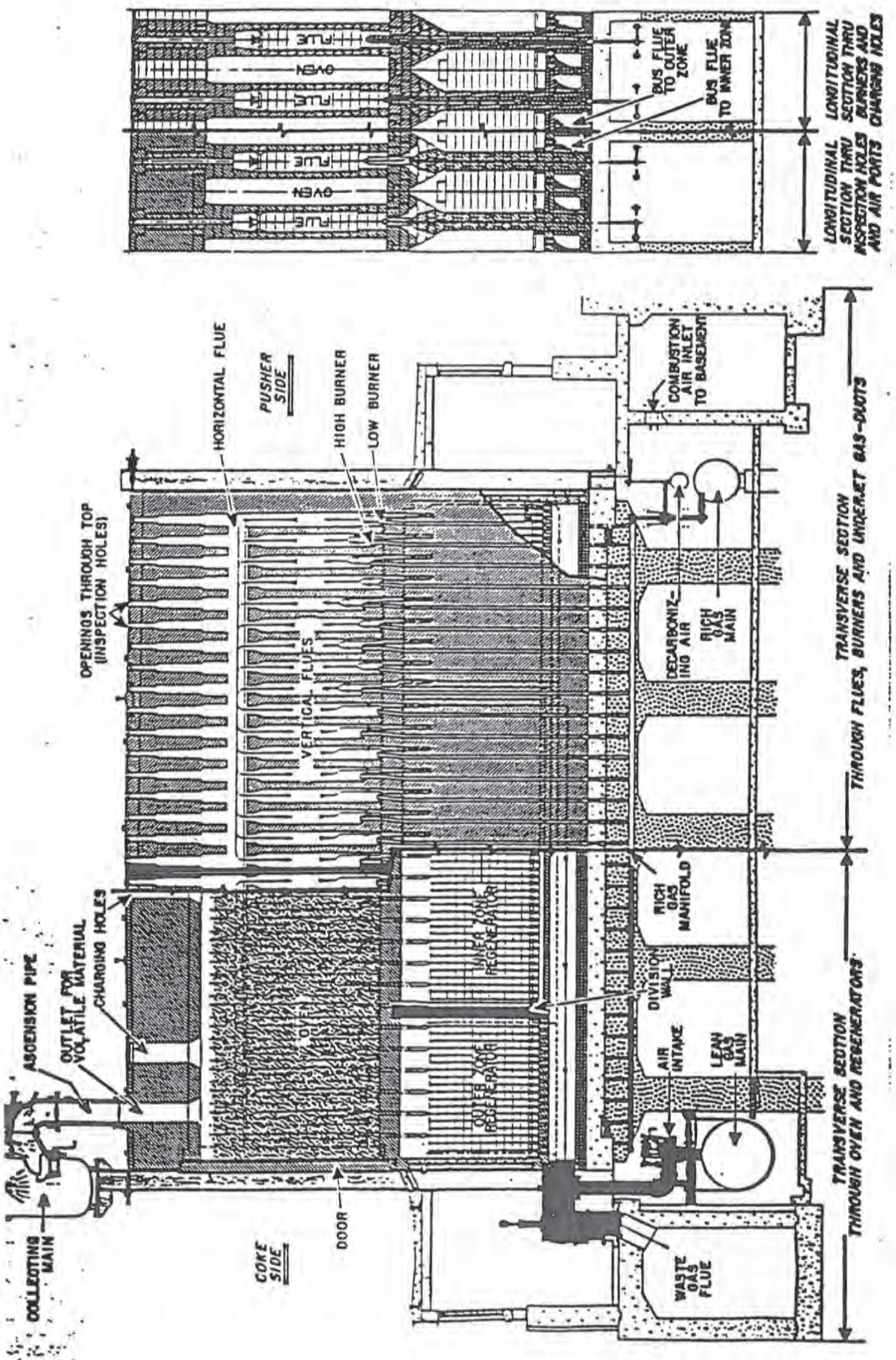
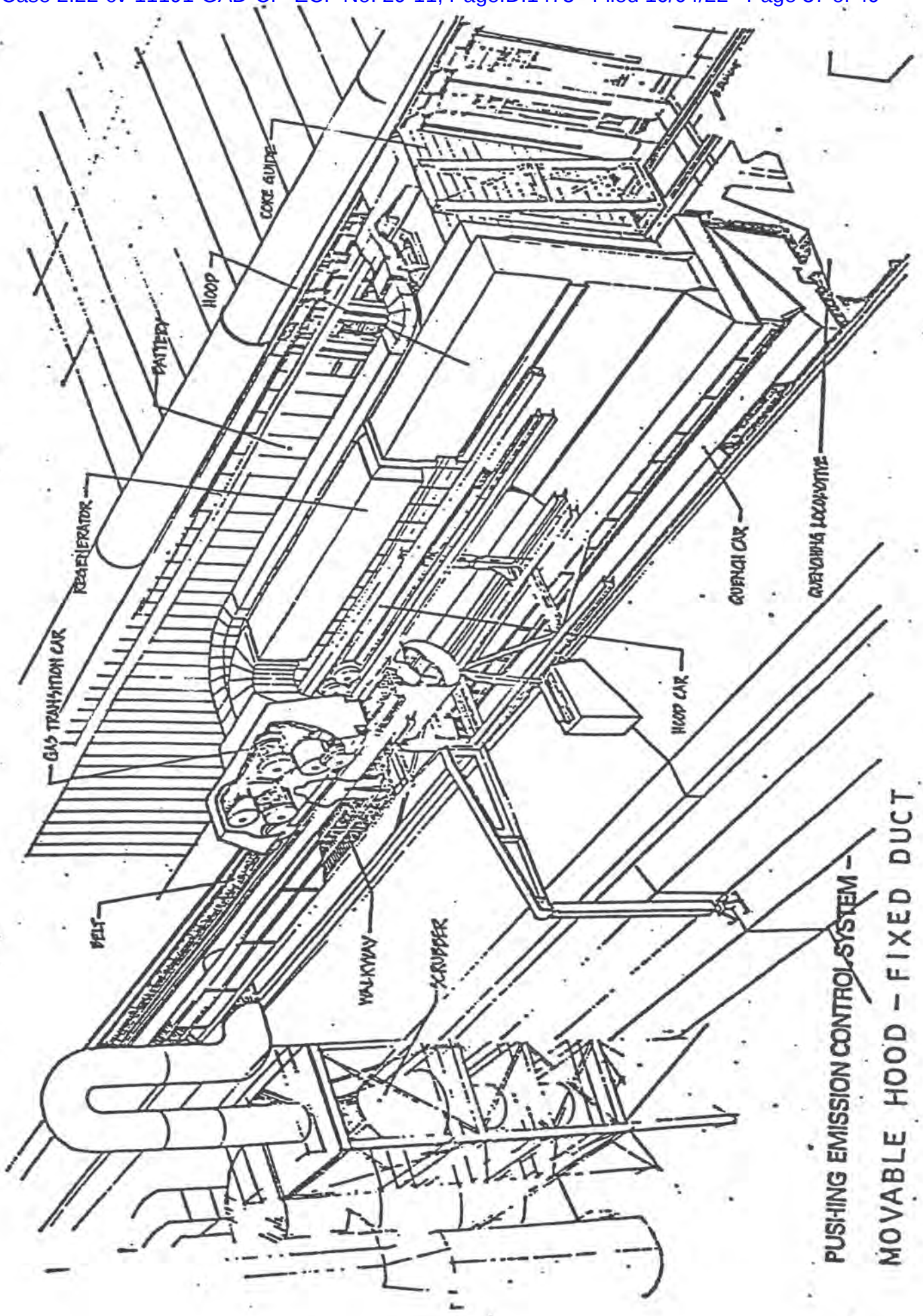
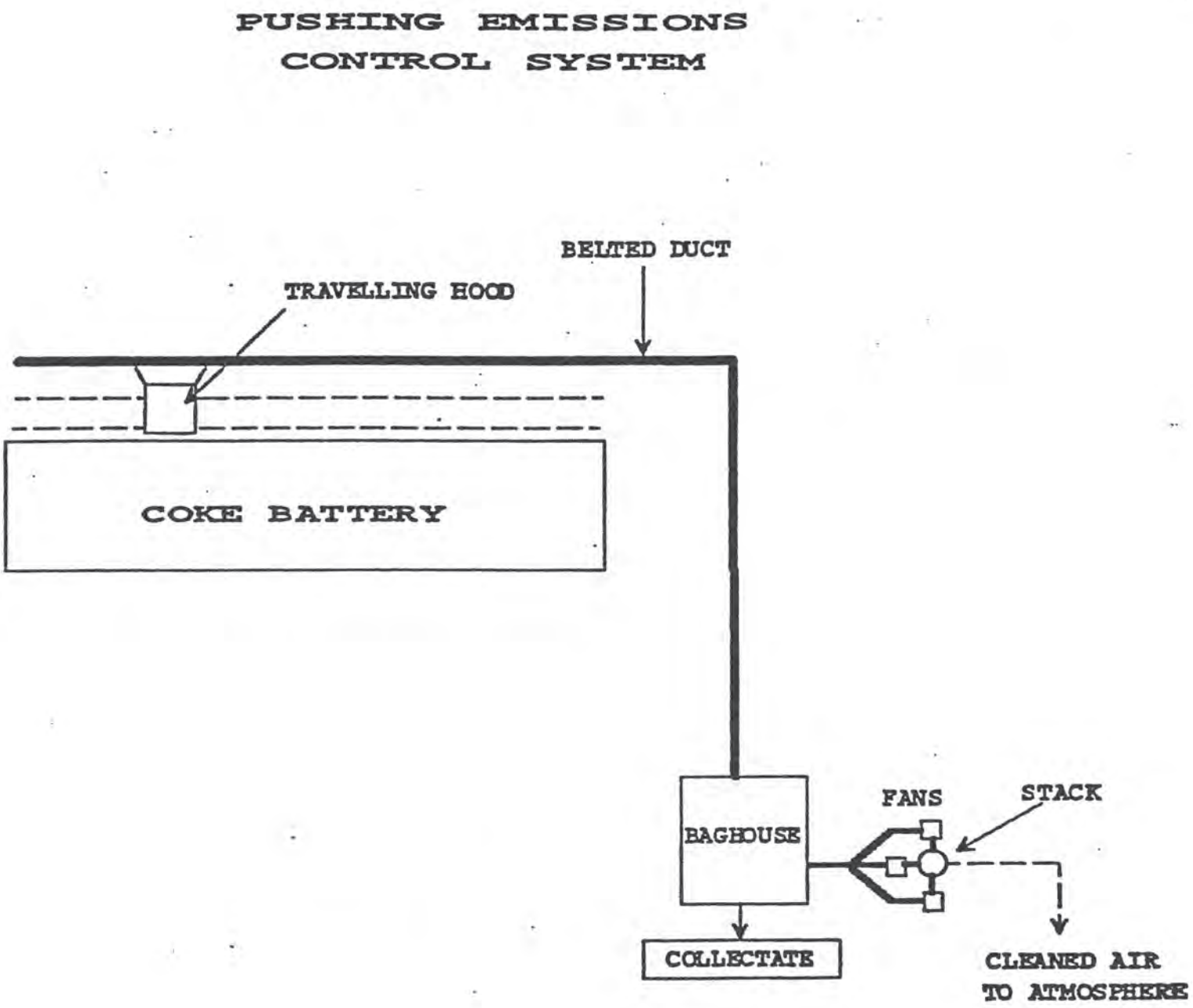


FIGURE 2 - Cross-sectional drawing of a coke battery showing the oven and the vertical flues



MOVABLE HOOD – FIXED DUCT

FIGURE 3



RE 4 - Schematic of the pushing emission control system proposed by National Steel Corporatio

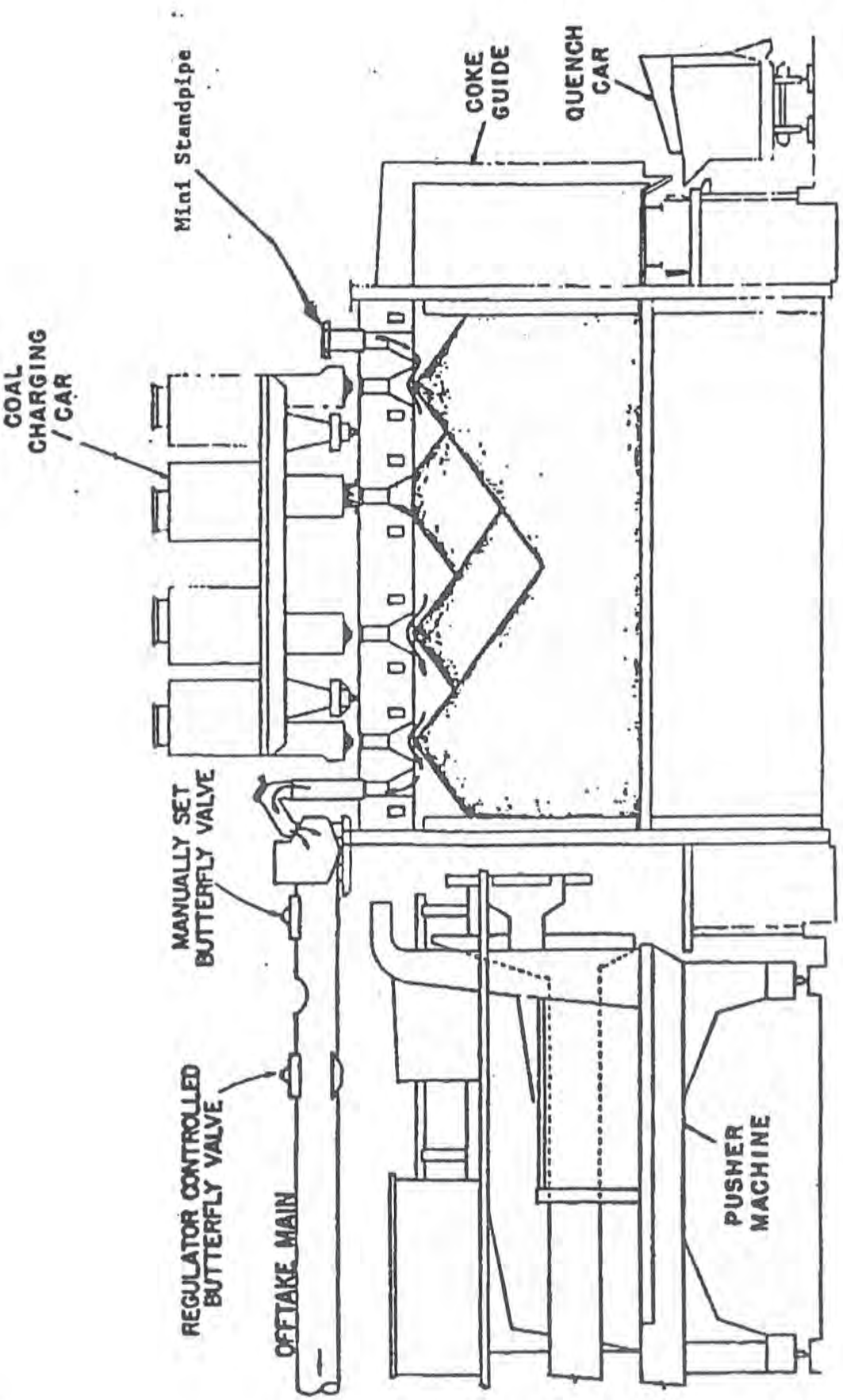


FIGURE 5. Schematic arrangement of a coke oven equipped for "staged charging" or "sequenced charging." (Courtesy, Koppers Company, Incorporated.)

EXHIBIT 1


SEE DETAIL, EXHIBIT 1A
GENERAL HIGHWAY MAP
WAYNE COUNTY
MICHIGAN
STATE HIGHWAY COMMISSION
DEPARTMENT OF STATE HIGHWAYS
HIGHWAY PLANNING SURVEY
LAKE ST CLAIR
GROSSE POINTE
DEARBORN
ALLEN PARK
TAYLOR
WESTLAND
TOWN
MONROE

EXHIBIT 11


N
Turning Basin
RIVER ROUGE
Sewage Disposal
Zug Island
PROPOSED No. 5 BATTERY
TAILINGS POND
CONVEYOR
CANAL
Powerplant
DETROIT
RIVER ROUGE
Park
UNITED STATES CANADA
ECORSE
Conveyor
WYANDOTTE 3 MI
MONROE 29 MI
83°07'30"
2 330 000 FEET

EXHIBIT 2

Summary of Criteria Pollutant Information

Particulate

Process	Control Technology	Original Emissions (TPY)	Proposed Emissions (TPY)
Charging	Staged charging	7.2	5.7
Door Leaks	5% leakage	29.4	17.6
Pushing	Belted duct with baghouse	11.9	9.7
Quenching	Baffled quench tower with clean water	589.1	351.0
Combustion Stack	0.012 grains/DSCF	268.4	112.6
Standpipes	4% leakage	10% leakage	4% leakage
Charging Lids	1% leakage	4% leakage	1% leakage
TOTAL		906	496.6

EXHIBIT 2

Summary of Criteria Pollutant Information - Continued

PM-10

Process	Control Technology	Original Emissions (TPY)	Proposed Emissions (TPY)
Charging	Staged charging	3.5	2.8
Door Leaks	5% leakage	20.0	12.0
Pushing	Belted duct with baghouse	10.3	8.4
Quenching	Baffled quench tower with clean water	190.3	34.4
Combustion Stack	0.012 grains/DSCF	257.4	108.0
Standpipes	4% leakage	10% leakage	4% leakage
Charging Lids	1% leakage	4% leakage	1% leakage
TOTAL		481.5	165.6

Sulfur Dioxide

Process	Control Technology	Original Emissions (TPY)	Proposed Emissions (TPY)
Charging	Staged charging 55 seconds/5 charges	0.30	0.24
Combustion Stack	Annual heat input restriction for coke oven gas	1606.7	2033
TOTAL		1607.0	2033.24

EXHIBIT 2

Summary of Criteria Pollutant Information - Continued

Carbon Monoxide

Process	Control Technology	Original Emissions (TPY)	Proposed Emissions (TPY)
Charging	Staged charging	9.1	7.2
Door Leaks	5% leakage	32.6	19.5
Pushing	----	31.7	45.5
Combustion Stack	0.0788% by volume	2191	1916
TOTAL		2264.4	1988.2

Volatile Organic Compounds

Process	Control Technology	Original Emissions (TPY)	Proposed Emissions (TPY)
Charging	Staged charging	37.6	29.9
Door Leaks	5% leakage	81.6	48.8
Pushing	0.94% volatile matter in coke	90.6	110.1
TOTAL		219.8	188.8

EXHIBIT 2

Summary of Criteria Pollutant Information - Continued

Nitrogen Oxides

Process	Control Technology	Original Emissions (TPY)	Proposed Emissions (TPY)
Charging	Staged charging	0.5	0.4
Door Leaks	5% leakage	0.5	0.3
Combustion Stack	0.4 pounds/10^6 BTU	494	672
TOTAL		495.0	672.7

EXHIBIT 3

Summary of Non-criteria Pollutant Information

Ammonia

Process	Control Technology	Original Emissions (TPY)	Proposed Emissions (TPY)
Charging	Staged charging 55 seconds/5 charges	0.30	0.24
Door Leaks	5% leakage	3.26	1.95
Pushing	----	45.3	65.0
TOTAL		48.9	67.2

Benzene

Process	Control Technology	Original Emissions (TPY)	Proposed Emissions (TPY)
Charging	Staged charging 55 seconds/5 charges	7.70	5.98
Door Leaks	5% leakage	1.09	0.65
Pushing	----	2.72	---
Quenching	----	0.12	---
Topsides	4% leakage (standpipes) 1% leakage (lids)	0.091	0.065
TOTAL		11.72	6.70

EXHIBIT 3

Summary of Non-criteria Pollutant Information - Continued

Benzo-a-pyrene

Process	Control Technology	Original Emissions (TPY)	Proposed Emissions (TPY)
Charging	Staged charging	0.000267	0.0000286
Door Leaks	5% leakage	0.13	0.0024
Pushing	----	0.018	---
Quenching	----	0.14	---
Standpipes	4% leakage	0.0033	0.0022
Charging Lids	1% leakage	0.0066	0.0011
TOTAL		0.303	0.0057

Benzene Soluble Organics

Process	Control Technology	Original Emissions (TPY)	Proposed Emissions (TPY)
Charging	Staged charging	0.0267	0.00286
Door Leaks	5% leakage	12.6	0.24
Pushing	----	36.3	---
Quenching	----	2.9	---
Standpipes	4% leakage	0.33	0.22
Charging Lids	1% leakage	0.16	0.11
TOTAL		52.31	0.57

EXHIBIT 4

Summary of Offset Information

Particulate

Emissions		Offset Ratio Required by	Actual Offset Ratio
Original Battery (TPY)	Proposed Battery (TPY)	Rule 221	Achieved
906.0*	496.6**	1.2***	1.75****

* Total particulate emissions from original battery. Process emissions from original battery are 869.4 tons/year.
** Total particulate emissions from rebuilt battery.
*** Offset ratio that is required if only process emissions from original battery are used in offset exercise.
**** Offset ratio achieved using only process emissions from original battery

Volatile Organic Compounds

Emissions		Offset Ratio Required by	Actual Offset Ratio
Original Battery (TPY)	Proposed Battery (TPY)	Rule 220	Achieved
209.8	188.8	1.1	1.11